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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

WARTIME REPORT

ORIGINALLY ISSUED January 1942 as Memorandum Report

PRESSURE DISTRIBUTION MEASUREMENTS OF A MODEL OF A

DAVIS WING SECTION WITH FOWLER FLAP SUBMITTED BY

COMSOLIDATED AIRCRAFT CORPORATION

By Ira H. Abbott

Iangley Memorial Aeronautical Laboratory Langley Field, Va.

> AIR DOCUMENTS DIVISION, T-2 AMC. WRIGHT FIELD MICROFILM No. RC-573 F/6140

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MEMORANIUM REPORT

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Material Division, Army Air Corpo

PRESSURE-DISTRIBUTION MEASUREMENTS OF A MODEL OF A

DAVIE WING SECTION WITH FOWLER FLAP SUBMITTED BY

CONSOLIDATED AIRCRAFT COPPORATION

By Iro. H. Abbott

THTROTHCTTON

Pressure-distribution measurements were made of the request of the Material Division, U.S. Army Air Corps, on a 2k-inch cherd model equipped with a Fowler flap and submitted by the Consolidated Aircraft Corporation. The tests were made in the Longley twodimensional turnel at a Reynolds number of about 5,000,000.

The model is of a section of the Davis wing for the XB-32 airplane and is described in reference 1. The labor for the pressure orifices in the flap were removed for the tools of reference 1 to provent possible interference with the flaw through the slot. These tubes were replaced for the pressure-distribution tests in essentially the same manner as when received except that smaller disaster tubes were used to minimize possible interference offects.

RESULTS AND DISCUSCION

Pressure-distribution diagrams for several angles of attack, and flap deflections of C° , $2C^\circ$, and $4C^\circ$ are presented in figures 1 to 16. Pressures are plotted directly as obtained from the manemater in terms of 1/2-inch units of carbon tearnehleride. The abscisse is the measured projection on the chard line of the pressure crifices. The values of the corrected dynamic pressure q and the impact pressure level in terms of the same units are given an each figure. The static pressure level is obtained by adding the value of q to the impact pressure level. The value $\left(\frac{v}{V}\right)^2$, where v is the local velocity and V is the free-stream velocity, is obtained by dividing the local pressure, measured from the impact pressure level, by the value of q.

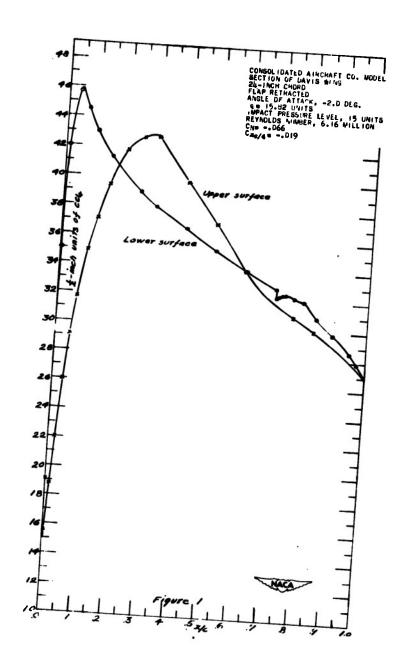
The normal-force coefficient ON, as obtained by integration. force coefficients are in reas while agreement with the lift coefficients presented in reference 1 except near the maxima lists with flap deflected. The present tests inclose a lower viling of the maximum lift coefficient than those presente: in reference 1 and this is thought to be caused by the interference of the program tubes on the flap. At each flap deflection the pressure distribution presented at the highest angle of attack was taken at ar very close

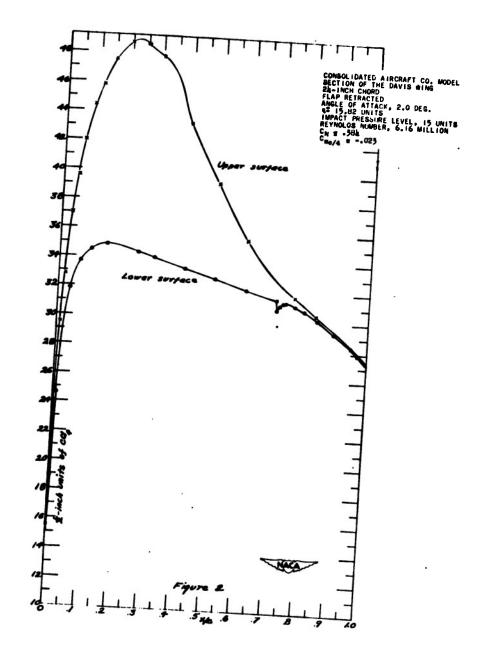
Moment coefficients about the quarter-chord point comply are also presented as obtained by integration of the diagrams. These moment coefficients do not contain the compensation of moment due to the chord force which may be appropriate, especially for the flaprepletting the diagrams against displacement of the crificos

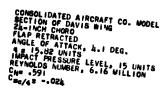
Langley Memortal ner nautical Laboratory, National Advisory Committee for Aer mentice, Langley Field, Va., January 17, 1942.

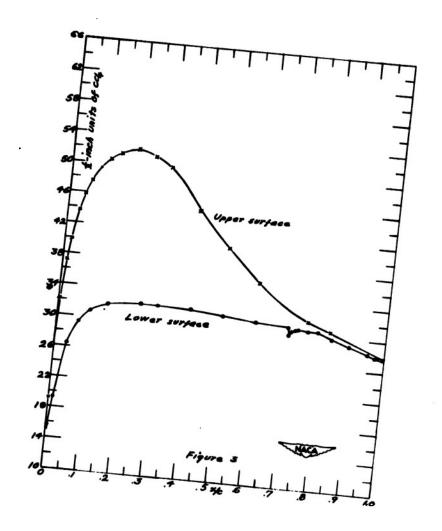
THE REPORT

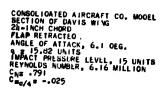
1. Abbott, Ira H., and Turner, Har 1d R., Jr.: Lift and Brag Tests of Three Airfoll Models with Fowler Flaps Submitted by Consolidated Aircraft Corporation. NACA MR, Dec. 29, 1941.

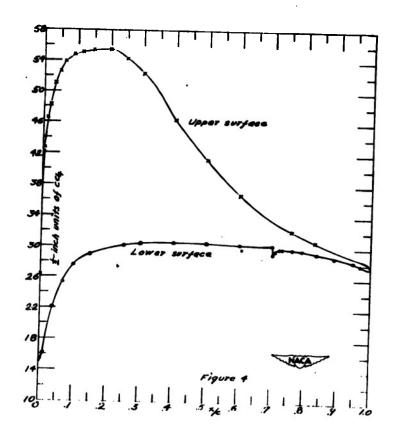




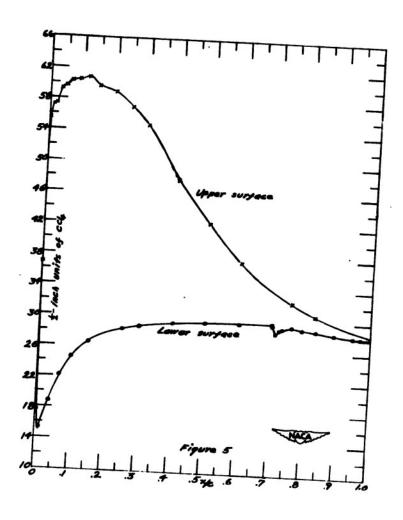


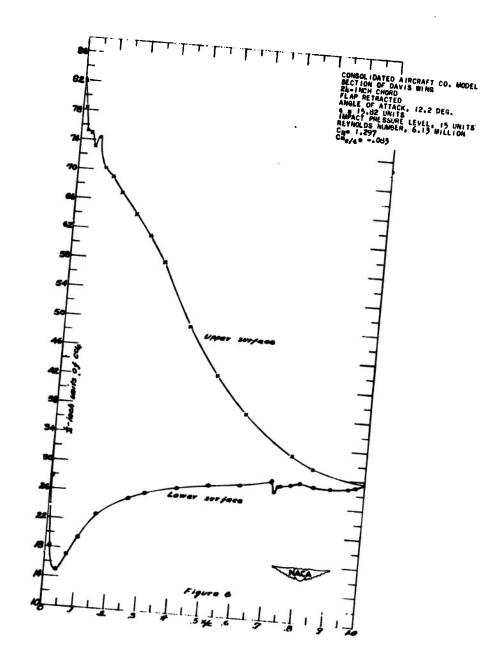


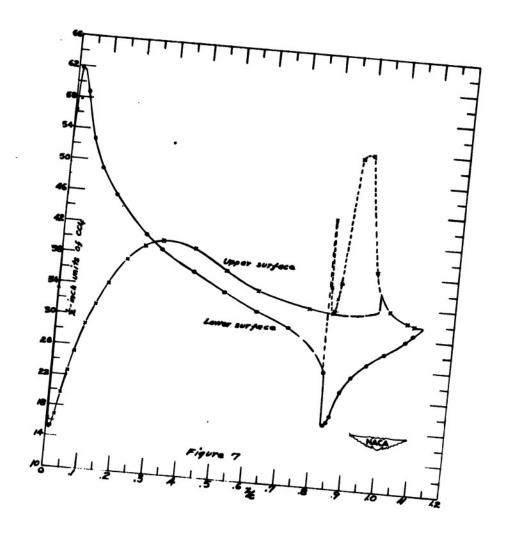




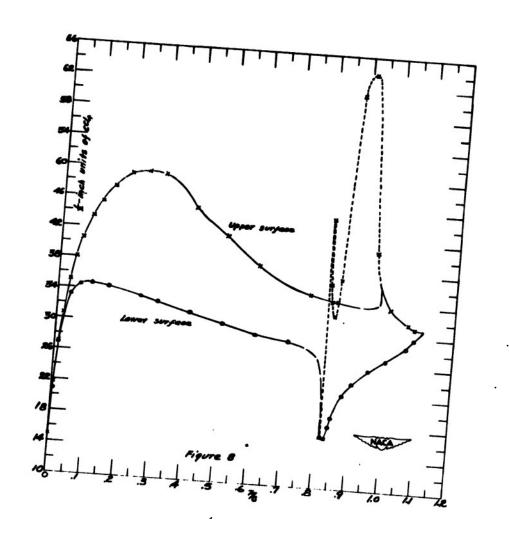
COMBOLIDATED AIRCRAFT CO. MODEL SECTION OF DAVIS WING 2A-INCH CHORD FLAP RETRACTED AMGLE OF ATTACK, 6.1 DEG. 4.8 19.82 UNITS IMPACT PRESSURE LEVEL, 15 UNITS REYNOLDS MANBER, 6.16 MILLION CNE.991
CEg/4 = -.026







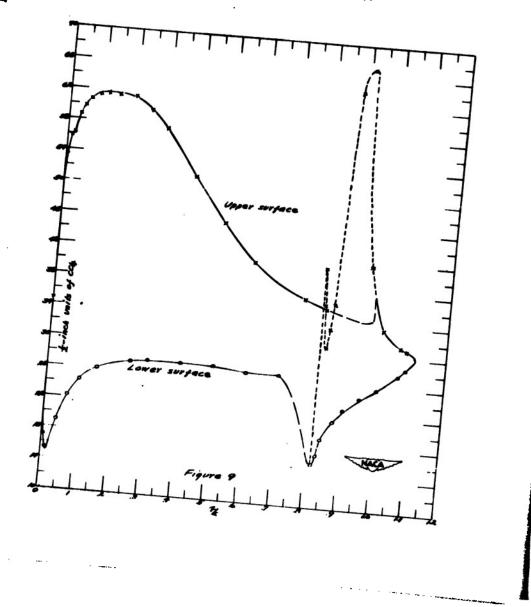
CONSOLIDATED AIRCRAFT CO. MODEL SECTION OF DAVIS WING 24-INCH CHORD FLAP DEFLECTED 20 DEG. ANGLE OF ATTACK - 2 DEG. 4 SIZE UNITS - 2 DEG. IMPACT FRESSURE LEVEL, 15 UNITS CHORD SMIMBER, 6.13 MILLION CMg/4 2 -.185

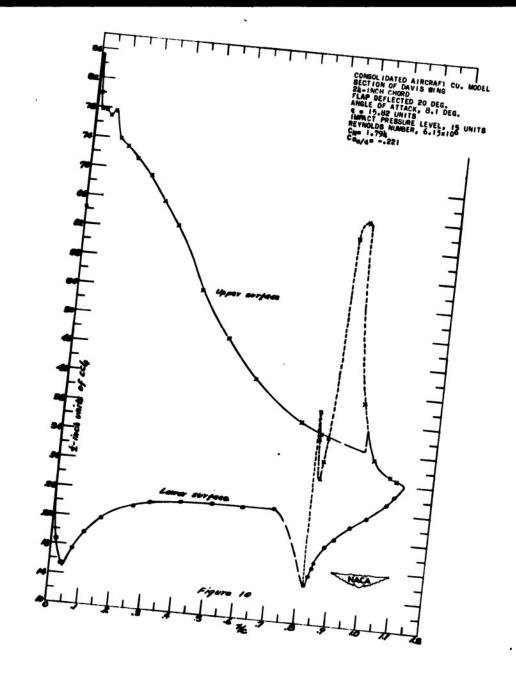


CDMSULIDATED AIR MAFT CO. MODEL SECTION OF DAYIS WING 24-INCH CHORD FLAP DEFICE CTED 20 DEG. ANGLE OF ATTACK, 4. I DEG. 219-82 UNITS IMPACT PRESSURE LEVEL, 15 UNITS CAMP 1.415

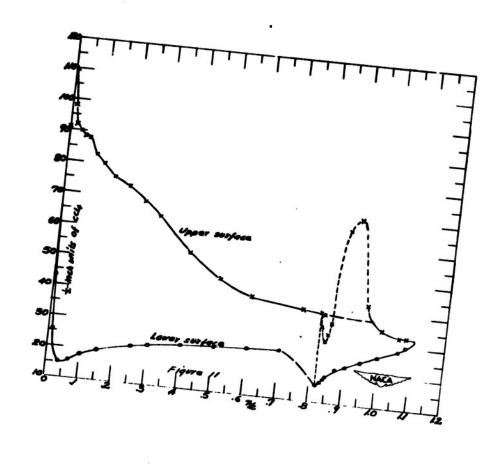
CMM 1.415

CMM/4 = -.226

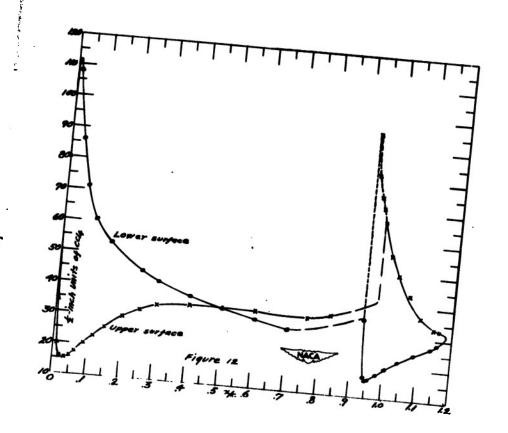


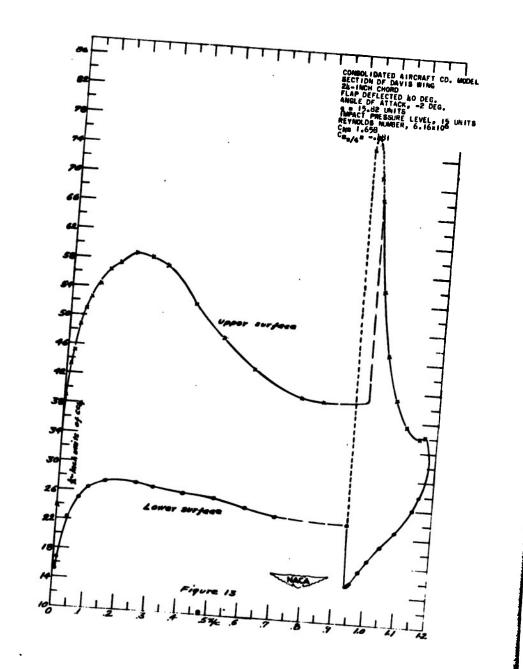


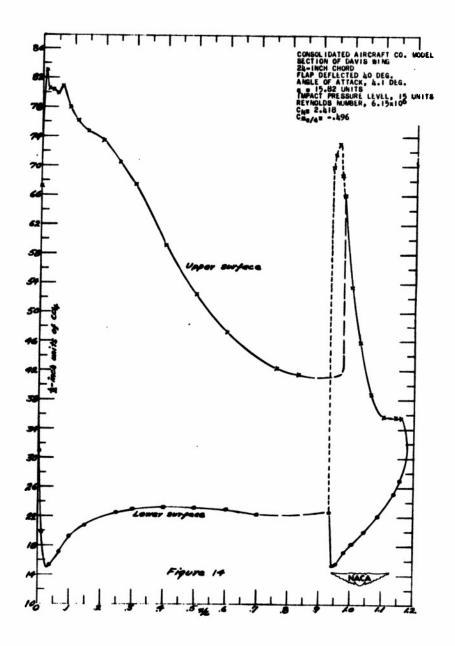
CONSOLIDATED AIRCRAFT CD. MODEL BECTION DF DAVIS WING 24-INCH CHORD FLAP DEFLECTED 20 DEG. ANGLE OF ATTACK, 12-3 DEG. IMPACT PRESSURE LEVEL, 15 UNITS REVNOLDS NUMBER, 6.08=106 CMe 1.979 CMe/4 = -.231



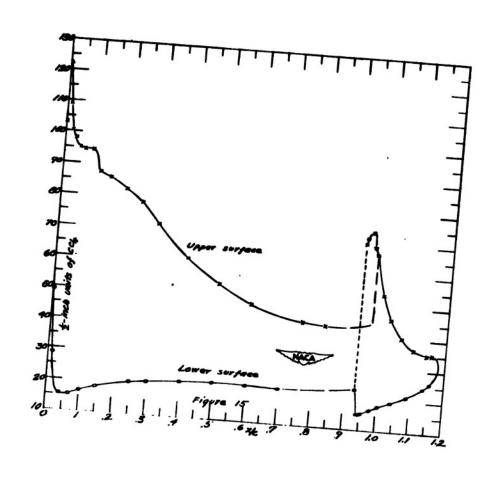
CONSOLIDATED AIRCRAFT CO. MODEL SECTION OF DAVIS WING 24-INCH CHORD FLAP DEFLECTED 40 DEG. ANGLE OF ATTACK, -17.3 DEG. B. 19.42 UNITS -17.3 DEG. IMPACT PRESSURE LEVEL, 15 UNITS REYNOLDS NUMBER, 6.16x106 CMs -.294 CMs/4s -.390

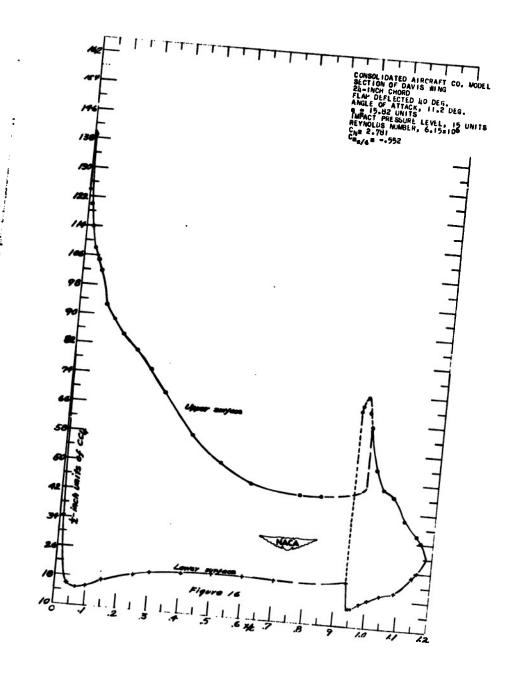






CDNSOLIDATED AIRCRAFT CD. MODEL BECTION OF DAVIS WING 24-INCH CHORD FLAP DEFLECTED NO DEG. ANGLE OF ATTACK, d.i DEG. ANGLE OF ATTACK, d.i DEG. ISPACT PRESSURE LEVEL, 15 UNITS REYNOLDS NUMBER, 6.15 #106 CMa 2.725 Cma/4 = -.501





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                             CROSS REFERENCES: Pressure dietribution - Wings (74500) MR-L-678
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                                                                                             REVISION
               AUTHOR(S)
          AMER. WILE: Preseure-distribution measurements of a model of a Davie wing section with
                    Fowler flap submitted by Coneolidated Aircraft Corporation
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           about 6.000.000.
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                                               AD FECHNICAL MOEX
               T-2, KQ., AD MATERIEL COMMAND
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TSDW FORM 80 (13 HMR 47) Abbott, Ira H. AUTHOR(S) FORG'N, TITLE:

DIVISION: Aerodynamics (2) SECTION: Wings and Airfoils (6) CROSS REFERENCES: Pressure distribution - Wings (74500) MR-L-678 Wings - Aerodynamics (99150)

ATI- 16140 ORIG. AGENCY NUMBER

REVISION

AMER. TITLE: Pressure-distribution measurements of a model of a Davis wing section with Fowler flap submitted by Consolidated Aircraft Corporation

ORIGINATING AGENCY: National Advisory Committee for Aeronautics, Washington, D. C.

TRANSLATION-COUNTRY II.S.

LANGUAGE FORGINGIASS U. S.CLASS. | DATE | PAGES | ILLUS Eng. Unclass. Jan'42 18

16 graphs

FEATURES

ABSTRACT Wing pressure distribution diagrams for several angles of attack and flap deflections of 0°, 20°, and 40° are presented. The normal force coefficients agree with lift coefficients obtained in previous test of the same model, except for the maximum lifts with flap deflection. Pressure distribution measurements were made at Reynolds Number of about 6.000.000.

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